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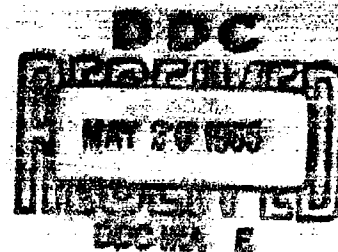
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TECHNICAL MANUSCRIPT 220

ULTRAMICROANALYSIS  
OF SELECTED BLOOD COMPONENTS  
OF NORMAL MACACA MULATTA

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TECHNICAL MANUSCRIPT 220

ULTRAMICROANALYSIS OF SELECTED BLOOD COMPONENTS  
OF NORMAL MACACA MULATTA

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Project 1C522301A080

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#### ABSTRACT

Plasma from the blood of 212 Macaca mulatta (rhesus) monkeys was tested for eleven chemical components by ultramicroanalysis. Results are tabulated and discussed.

In conducting the research reported herein, the investigator adhered to "Principles of Laboratory Animal Care" as established by the National Society for Medical Research.

ULTRAMICROANALYSIS OF SELECTED BLOOD COMPONENTS  
OF NORMAL MACACA MULATTA

Relatively little information is available on the blood chemistry of rhesus monkeys. Several reports have been published on this subject, but the studies were limited in scope and based on a small number of animals.<sup>1-4\*</sup> In studies in which monkeys are experimentally infected or treated, established normal values for the blood components assume practical importance. Changes in the blood chemistry patterns of infected animals from these values may be discerned as a result of the experiments. The purpose of this study, therefore, was to establish baseline values for selected chemical components of the blood of presumably healthy rhesus monkeys by ultramicroanalytical methods. Ultramicroanalyses involves microliter volumes, and the methods are those in which the volume of serum or plasma to be analysed is 1 to 50 microliters.<sup>5-7</sup>

Heparinized blood samples were obtained by removing 0.5 ml of blood from the veins of each of 212 rhesus monkeys. These animals ranged in weight from 4 to 7 pounds, and were determined to be tuberculin-negative, free of diarrhea, and in good physical condition. Their diet consisted of water and Purina Monkey Chow fed ad libitum.

The Beckman Spinco Model 150 ultramicroanalytical system was used to obtain all blood chemistry data. The procedures found in the Beckman Spinco Instruction Manual<sup>8</sup> were employed to make the following determinations: bilirubin (total), calcium, chloride, cholesterol, creatinine, glucose, phosphorus, total protein, albumin, urea nitrogen, and uric acid. All ultramicroanalyses of the 11 selected components were carried out with only 0.19 ml of plasma.

The results of the ultramicroanalysis of plasma for 11 blood components are shown in Table 1.

In general, the results listed are approximately the same as those of Kraner and Parshall.\*\* These workers carried out ultramicroanalyses on 89 rhesus monkeys, testing for 6 of the 11 blood components listed in Table 1 by the same type of system. Results are shown in Table 2. Their ranges were narrower than those reported in this study, but the mean values were comparable in all determinations except those of calcium. The probable reason for this discrepancy is the indistinct endpoint of the assay employed. This discrepancy has been mentioned by O'Brien et al.<sup>9</sup> and Knights et al.<sup>10</sup>

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\* Kraner, E., and C.J. Parshall. Personal communication.

\*\* Unpublished data. See Acknowledgments.

TABLE 1. CONCENTRATION OF SELECTED CHEMICAL COMPONENTS  
OF NORMAL RHESUS MONKEY PLASMA

Number Monkeys Tested	Component	Mean Value	Standard Deviation	Range	
				Lower	Upper
188	Bilirubin (mg %)	0.36	0.21	0.10	0.90
198	Calcium (mEq/liter)	4.86	0.81	3.00	6.86
190	Chloride (mEq/liter)	108.29	10.30	89.33	129.40
176	Cholesterol (mg %)	161.71	37.80	91.60	245.25
170	Creatinine (mg %)	1.41	0.31	0.80	2.32
180 <sup>a/</sup>	Glucose (mg %)	61.80	17.10	30.25	108.30
166	Phosphorus (mg %)	5.00	0.95	3.06	7.31
189	Total Protein (gm %)	6.33	0.68	4.20	7.98
189	Albumin (gm %)	4.43	0.95	2.41	5.84
179	Urea Nitrogen (mg %)	22.38	6.53	10.00	41.18
185	Uric Acid (mg %)	0.88	0.41	0.42	1.93

a. Fasting.

TABLE 2. DATA OBTAINED FROM KRANER AND PARSHALL  
ON THE PLASMA FROM 89 RHESUS MONKEYS<sup>a/</sup>

Component	Mean Value	Range	
		Lower	Upper
Calcium (mEq/liter)	6.35	5.0	8.85
Chloride (mEq/liter)	111.8	100.0	127.0
Cholesterol (mg %)	166.9	140.0	207.0
Phosphorus (mg %)	4.59	3.2	6.2
Total Protein (gm %)	6.16	4.9	7.3
Uric Acid (mg %)	1.196	0.76	1.8

a. Unpublished data used with permission of workers.

Comparison of data from this study with those reported in the literature is of limited value,<sup>1-4</sup> because the data in those reports are based on an insufficient number of animals and the use of macroanalytical techniques.

In this writer's experience, the time required to perform these ultramicroanalytical techniques is about the same as that required by macrotechniques. The advantage of the ultramicroanalysis is that a number of examinations, necessitating repeated bleedings, can be performed on a single monkey without altering chemical blood values. The analyses for the 11 chemical blood components reported herein required only 190 microliters of plasma.

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